

## CLAIMS

- 1        1. A process of detecting an oligonucleotide elongation, the process  
2 comprising the steps of:
  - 3            (a) providing an oligonucleotide;
  - 4            (b) combining a detectable moiety and the oligonucleotide to form a  
5            labeled oligonucleotide, the labeled oligonucleotide characterized  
6            by an association independent of a dual contribution covalent bond  
7            between the detectable moiety and the oligonucleotide;
  - 8            (c) adding the labeled oligonucleotide to an oligonucleotide elongation  
9            mixture;
  - 10          (d) initiating an elongation reaction in the oligonucleotide elongation  
11          mixture; and
  - 12          (e) assaying for the labeled oligonucleotide in the oligonucleotide  
13          elongation mixture to detect the oligonucleotide elongation.
- 1        2. The process of claim 1 wherein the non-covalent association is  
2 selected from the group consisting of: an ionic bond, a hydrogen bond, a Van der  
3 Waals interaction and an organometallic coordinate covalent bond.
- 1        3. The process of claim 1 wherein the detectable moiety comprises a  
2 fluorophore.
- 1        4. The process of claim 1 wherein the detectable moiety comprises a  
2 metal-containing fluorescent compound.
- 1        5. The process of claim 4 wherein the metal-containing fluorescent  
2 compound comprises platinum.
- 1        6. The process of claim 4 wherein the metal-containing fluorescent  
2 compound comprises a metal selected from the group consisting of: palladium,  
3 rhodium, ruthenium, osmium, and iridium.

1           7.     The process of claim 1 wherein the elongation reaction is a  
2     polymerase chain reaction.

1           8.     The process of claim 1 wherein the elongation reaction is a reverse  
2     transcription reaction.

1           9.     The process of claim 1 wherein the elongation reaction is a primer  
2     extension reaction.

1           10.    The process of claim 1 wherein the elongation reaction is a ligase  
2     chain reaction.

1           11.    The process of claim 1 wherein the process further comprises the  
2     step of purifying the labeled oligonucleotide.

1           12.    The process of claim 1 wherein the step of assaying the labeled  
2     oligonucleotide comprises a measurement of fluorescence polarization.

1           13.    The process of claim 1 wherein the step of assaying the labeled  
2     oligonucleotide comprises a measurement of fluorescence intensity.

1           14.    The process of claim 1 wherein the step of assaying the labeled  
2     oligonucleotide comprises a measurement of fluorescence resonance energy  
3     transfer.

1           15.    A process of detecting an oligonucleotide elongation, the process  
2     comprising the steps of:

- 3           (a)    providing an oligonucleotide elongation reaction mixture  
4     comprising an oligonucleotide labeled with a fluorescent  
5     compound by an association independent of a dual contribution  
6     covalent bond;

- 7                 (b) measuring a fluorescence parameter in the oligonucleotide  
8                 elongation reaction mixture at a first time point to obtain a test  
9                 measurement; and  
10                (c) comparing the test measurement with a reference measurement to  
11                detect the oligonucleotide elongation.

1                 16. The process of claim 15 wherein the reference is a second  
2                 measurement of a fluorescence parameter in the oligonucleotide reaction mixture  
3                 at a second time point.

1                 17. The process of claim 16 wherein the second time point is before  
2                 initiation of the elongation reaction.

1                 18. The process of claim 16 wherein the first and second time points  
2                 are after initiation of the elongation reaction.

1                 19. The process of claim 15 wherein the reference is a measurement of  
2                 a fluorescence parameter in a second oligonucleotide extension reaction mixture.

1                 20. The process of claim 15 wherein the non-covalent association is  
2                 selected from the group consisting of: an ionic bond, a hydrogen bond, a Van der  
3                 Waals interaction and an organometallic coordinate covalent bond.

1                 21. The process of claim 15 wherein the fluorescent compound is a  
2                 metal-containing fluorescent compound.

1                 22. The process of claim 21 wherein the metal-containing fluorescent  
2                 compound comprises platinum.

1                 23. The process of claim 21 wherein the metal-containing fluorescent  
2                 compound comprises a metal selected from the group consisting of: palladium,  
3                 rhodium, ruthenium, osmium, and iridium.

1           24. The process of claim 15 wherein the elongation reaction is a  
2 polymerase chain reaction.

1           25. The process of claim 15 wherein the elongation reaction is a  
2 reverse transcription reaction.

1           26. The process of claim 15 wherein the elongation reaction is a primer  
2 extension reaction.

1           27. The process of claim 15 wherein the elongation reaction is a ligase  
2 chain reaction.

1           28. The process of claim 15 wherein the fluorescence parameter is  
2 selected from the group consisting of: fluorescence polarization and fluorescence  
3 intensity and fluorescence resonance energy transfer.

1           29. A process of detecting an oligonucleotide elongation, the process  
2 comprising the steps of:

- 3           (a) providing an oligonucleotide elongation reaction mixture  
4           comprising an oligonucleotide labeled with a metal-containing  
5           fluorescent compound;
- 6           (b) measuring a fluorescence parameter associated with the metal-  
7           containing fluorescent compound in the oligonucleotide elongation  
8           reaction mixture at a first time point to obtain a test measurement;  
9           and
- 10          (c) comparing the test measurement with a reference measurement to  
11          detect the oligonucleotide elongation.

1           30. The process of claim 29 wherein the metal-containing fluorescent  
2 compound comprises platinum.

1           31.   The process of claim 29 wherein the metal-containing fluorescent  
2   forms a coordinate covalent bond to label the oligonucleotide.

1           32.   The process of claim 29 wherein the metal-containing fluorescent  
2   compound comprises a metal selected from the group consisting of: palladium,  
3   rhodium, ruthenium, osmium, and iridium.

1           33.   The process of claim 29 wherein the elongation reaction mixture is  
2   a polymerase chain reaction mixture.

1           34.   The process of claim 29 wherein the fluorescence parameter is  
2   selected from the group consisting of: fluorescence polarization, fluorescence  
3   intensity and fluorescence resonance energy transfer.

1           35.   The process of claim 29 wherein the reference is a second  
2   measurement of a fluorescence parameter in the oligonucleotide reaction mixture  
3   at a second time point.

1           36.   The process of claim 35 wherein the second time point is before  
2   initiation of the elongation reaction.

1           37.   The process of claim 35 wherein the first and second time points  
2   are after initiation of the elongation reaction.

1           38.   The process of claim 29 wherein the reference is a measurement of  
2   a fluorescence parameter in a second oligonucleotide extension reaction mixture.

1           39.   A process of detecting formation of an oligonucleotide hybrid, the  
2   process comprising the steps of:

3           (a)   providing a hybridization reaction mixture comprising an  
4   oligonucleotide labeled with a metal-containing fluorescent  
5   compound;

- 6                   (b) measuring a fluorescence parameter associated with the metal-  
7                   containing fluorescent compound in the hybridization reaction  
8                   mixture at a first time point to obtain a test measurement; and  
9                   (c) comparing the test measurement with a reference measurement to  
10                  detect the oligonucleotide hybridization.

1                 40. The process of claim 39 wherein the metal-containing fluorescent  
2                 compound comprises platinum.

1                 41. The process of claim 39 wherein the metal-containing fluorescent  
2                 forms a coordinate covalent bond to label the oligonucleotide.

1                 42. The process of claim 39 wherein the metal-containing fluorescent  
2                 compound comprises a metal selected from the group consisting of: palladium,  
3                 rhodium, ruthenium, osmium, and iridium.

1                 43. The process of claim 39 wherein the reference is a second  
2                 measurement of a fluorescence parameter in the oligonucleotide reaction mixture  
3                 at a second time point.

1                 44. The process of claim 43 wherein the second time point is before  
2                 initiation of the elongation reaction.

1                 45. The process of claim 43 wherein the first and second time points  
2                 are after initiation of the elongation reaction.

1                 46. The process of claim 39 wherein the reference is a measurement of  
2                 a fluorescence parameter in a second oligonucleotide extension reaction mixture.

1                 47. The process of claim 35 wherein the fluorescence parameter is  
2                 selected from the group consisting of: fluorescence polarization, fluorescence  
3                 intensity and fluorescence resonance energy transfer.

1           48.     A process for detection of changes in a nucleic acid essentially as  
2     described herein in any of the examples.

1           49.     A process for nucleic acid quantification essentially as described  
2     herein in any of the examples.

1           50.     A commercial package comprising a metal-containing fluorescent  
2     compound reaction mixture component along with instructions for use thereof to  
3     detect changes in an oligonucleotide indicative of elongation or hybridization.

1           51.     The use of a detectable moiety attached post-synthesis to an  
2     oligonucleotide for real-time detection of changes in nucleic acid elongation,  
3     amplification or hybridization.

1           52.     The use of claim 51 wherein the detectable moiety is a fluorophore.

1           53.     The use of claim 52 wherein the fluorophore is a metal-containing  
2     fluorescent compound.

1           54.     The use of claim 53 wherein the metal-containing fluorescent  
2     compound contains platinum.